



# Borescope-Guided Remote Zone Corrosion Mitigation Research Development Test and Evaluation

Mr. David Ellicks  
Sr. Materials Engineer  
AFRL/RXSSR



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# Overview

- Background
- The Challenge
- Program Objectives
- Initial RDT&E Results/Findings
- Current Developments
- Future Program Goals



# Background

- Growing need to address corrosion degradation in hidden and inaccessible zones of aging aircraft, vehicles, support equipment
- Cost to depot: Unplanned “Over and Above” corrosion maintenance must be addressed on the line—causes bottlenecks and late deliveries
- Cost to field: False sense of safety; reactive corrosion maintenance—adversely effects equipment availability
- Budgetary constraints limit new acquisitions—Sustainment of existing assets is a “MUST DO”



# The Challenge

- **Develop tools and processes to aggressively address corrosion in hidden structural zones**

## **Must be:**

- **Non-invasive**—Borescope-enabled; No teardown required; minimal panel removal
- **Portable**—Lightweight; Small footprint
- **Practical/Feasible**—Enables remote zone corrosion mitigation using COTS (with minimal mods) tooling
- **Cost effective**—Process value/benefits outweigh cost of corrosion repair labor/materials
- **Highly capable**—Versatile equipment package treats corrosion in the most inaccessible structural zones susceptible to corrosive attack (internal frame surfaces on vehicles/AGE; cargo aircraft sub-floor)





# Program Objectives

- **Initial Phase: COTS Equipment RDT&E (Sep 2010 – May 2011)**
  - Borescope-guided Corrosion removal tools
    - *Rotary (dremel-type) tools: Non-feasible*
    - *Portable abrasive blast: Non-feasible*
    - *Mini dry ice blast: Feasible*
  - Borescope-guided CPC application tools
    - *6.2mm working channel insertion tube: Feasible*
  - Borescope-guided Sealant application tools
    - *Pneumatic mini sealant gun: Non-feasible*
  - Borescope-guided mini vacuum
    - *Pneumatic gun vac: Non-feasible*
    - *Mini pneumatic suction vac: Feasible*





# Initial RDT&E Results/Findings

- **Mini Dry Ice Blast: Coldjet Microclean i3**
- **CPC Application: Olympus IV8635X1 Insertion Tube**
- **Mini Vacuum: Wandres SP-14 Suction Vac**





# Initial RDT&E Results/Findings

- **Mini Dry Ice Blast: Coldjet Microclean i3**

- Easily coupled to borescope
- Removes Corrosion Products
  - Surface corrosion, crevice corrosion
  - Excellent surface prep for CPC, Alodine, Primer
- Removes Paint, Sealant, Dirt
- Minor Abrasion to base materials only
- No secondary wastestream (CO2 sublimates)







# Initial RDT&E Results/Findings

- **CPC Application: Olympus IV8635X1 Insertion Tube**

- Superb remote CPC applicator in COTS configuration w/Sure Shot atomizer and AACL working channel extension tubes
- 6.2mm diameter of scope and CPC tube assembly—easily gains access to remote zones through structural gaps/fastener holes
- Compatible with Olympus Iplex FX industrial borescope—common equipment at most field units





# Initial RDT&E Results/Findings

- **Mini Vacuum: Wandres SP-14 Suction Vac**
  - Superb wet/dry capability
  - Easily coupled to borescope via AACL formable scope sleeves
  - Captures liquids/debris in spill-proof filtered container
  - Outstanding suction force
  - Lightweight/small footprint



**AACL Formable Scope Sleeves**



**Wandres SP-14 Mini-Vac**



# Current Developments

- **Follow-on RDT&E—H-1/HH-60 Remote Corrosion Mitigation Kit (RCMK) Prototype Build (Jun 2011 – Sep 2013)**
  - **Directly addresses recurring/costly corrosion issues in inaccessible zones on H-1 and HH-60 helicopters**
  - **Incorporates equipment identified in initial phase**
  - **Assemble highly portable/deployable field maintenance kit**
  - **COTS configurations with only slight modifications**
  - **Lays the foundation for T.O. 1-1-691 Remote Corrosion Mitigation supplement and aircraft-specific T.O. procedures (-23)**



# Future Program Goals

- Produce both “equipment-specific” and “multi-purpose” RCMK’s, expanding applicability
- Reduce RCMK footprint/weight—Increase capability through advanced technology
- Reduction in overall equipment sustainment costs
- Contribute to on-time depot turnaround
- Extend aircraft/equip service life
- Enabled enhanced “condition-based”, tail number-specific maintenance and operational planning
- Increase aircraft/equipment availability



# Open Floor



***Thank you for your time and attention!***